

10

PBX SYSTEMS
NO. 701A, 701B, 701PK, 702A, 711A, 711B OR 711PK
LINE OR TRUNK FINDER CIRCUIT
WITH ASSOCIATED COMMON GROUP AND
SUBGROUP CIRCUIT FOR
LINE FINDER APPLICATIONS
ARRANGED FOR RESTRICTED SERVICE

CHANGES

B. Changes in Apparatus

B.1 Superseded

A network, 178A,
option B

Superseded by

C1 and C2 capacitors,
542D, R resistor,
KS-13490, L2, 150 ohms,
option A

D. Description of Changes

D.1 Option B is designated and rated Mfr Disc. Option A is added and rated Standard to replace network A, 178A type, with two 542D capacitors C1 and C2, and one KS-13490, L2, 150-ohm R resistor.

D.2 Circuit Note 104 is updated to reflect the above change.

D.3 Circuit Note 108 regarding option S is rated A&M Only as option S was previously rated A&M Only.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 3224-RCL-RVL

PBX SYSTEMS
 NO. 701A, 701B, 701PK, 702A, 711A, 711B, OR 711PK
 LINE OR TRUNK FINDER CIRCUIT
 WITH ASSOCIATED COMMON GROUP AND
 SUBGROUP CIRCUIT FOR
 LINE FINDER APPLICATIONS
 ARRANGED FOR RESTRICTED SERVICE

TABLE OF CONTENTS	PAGE	
		A. <u>Make-Busy Key</u> 8
		B. <u>Removing Switch</u> 8
<u>SECTION I - GENERAL DESCRIPTION</u>	1	<u>SECTION IV - REASONS FOR REISSUE</u>
1. <u>GENERAL FUNCTION OF CIRCUIT</u>	1	
2. <u>GENERAL METHOD OF OPERATION</u>	1	<u>SECTION I - GENERAL DESCRIPTION</u>
<u>SECTION II - DETAILED DESCRIPTION</u>	2	1. <u>GENERAL FUNCTION OF CIRCUIT</u>
1. <u>FINDING INCOMING LINE OR TRUNK</u>	2	1.01 This line or trunk finder is used to connect a calling subscriber's line to a selector or selector connector. It is used to connect an incoming trunk circuit to an attendant trunk circuit. Further it is also arranged to detect certain abnormal operating conditions of the line finders and to cause an associated alarm circuit to function.
A. <u>Finding Incoming Line or Trunk Level</u>	2	
B. <u>Rotary Stepping</u>	2	
C. <u>Cut-Through</u>	2	
2. <u>RELEASE</u>	3	2. <u>GENERAL METHOD OF OPERATION</u>
3. <u>GROUP CIRCUIT - SD FIG. 3</u>	4	2.01 The incoming station line circuit is arranged to seize this line finder by passing a ground to the line finder subgroup circuit. The line finder is started by the operation of this circuit and it will then search for the line and attempt to connect this calling line to a selector or selector connector.
A. <u>Grounded Start Lead</u>	4	
B. <u>Foreign Potential on Chain Circuit</u>	4	
C. <u>All Line Finders Busy</u>	4	
D. <u>Call Blocked</u>	5	2.02 The incoming trunk circuit is arranged for direct inward dialed traffic. When the called station has been reached, that party can by flashing the switchhook call in an attendant who can connect the calling party to another station. When a few incoming trunks are used, flashing the switchhook will cause a lamp to light at the switchboard. When a large number of incoming trunks are provided, and it is advantageous to minimize the number of jack and lamp appearance at the switchboard, this trunk finder is used to concentrate the transferred traffic. The incoming trunk is connected to the finder bank multiple and when the switchhook is flashed, it causes the trunk finder to function to find the incoming trunk. The incoming trunk is then connected through to an attendant trunk circuit causing a lamp to light at the switchboard.
4. <u>TEST LINE JACKS - SD FIG. 4</u>	6	
5. <u>TEST KEY - SD FIG. C OF D</u>	6	
6. <u>LINE ASSIGNMENT</u>	6	
7. <u>TRUNK ASSIGNMENT</u>	6	
8. <u>LINE RESTRICTION TO FIRST SELECTOR</u>	7	2.03 The trunk finder is then held busy until both the incoming trunk becomes idle and the attendant has disconnected.
A. <u>Individual Station Restriction</u>	7	
B. <u>Station Subgroup Restriction</u>	7	
<u>SECTION III - REFERENCE DATA</u>	7	
1. <u>WORKING LIMITS</u>	7	
2. <u>FUNCTIONAL DESIGNATIONS</u>	7	
3. <u>FUNCTIONS</u>	7	
4. <u>CONNECTING CIRCUITS</u>	8	
5. <u>MANUFACTURING TESTING REQUIREMENTS</u> ...	8	
6. <u>TAKING EQUIPMENT OUT OF SERVICE</u>	8	

SECTION II - DETAILED DESCRIPTION1. FINDING INCOMING LINE-OR TRUNKA. Finding Incoming Line or Trunk Level

1.01 When the station line circuit is operated or when the incoming trunk is enabled to call in an attendant, it grounds the G- lead causing the G- relay in the subgroup circuit to operate. Operation of the G- relay grounds the SG start lead and also grounds the C- lead. Ground on the C- lead grounds a segment in the commutator corresponding to the level in which the incoming line or trunk is located. Ground on the SG lead causes the A relay in SD Fig. 1 to operate.

1.02 Relay A operated:

- (a) Opens the circuit to the release magnet.
- (b) Prepares a circuit to ground the S lead to the selector, selector connector converter trunk, or attendant trunk circuit when the C relay operates.
- (c) Prepares a circuit for the primary winding of the C relay.
- (d) Causes the C relay to operate on its secondary winding.

1.03 Operation of the C relay, energizes the vertical magnet which causes the shaft to step vertically one step. On the first vertical step, the VON springs function to ground the MS motor start lead and prepare operating and locking circuits for the D and E relays. Energization of the vertical magnet also opens its interrupter contacts causing the C relay to release. The release of the C relay denenergizes the vertical magnet, thus, reclosing its interrupter contacts and causing the C relay to reoperate. This stepping circuit, consisting of the C relay and vertical magnet, will function causing the switch to step vertically until the commutator brush reaches the segment which is grounded by the G- group relay.

1.04 When this grounded segment is reached, relay F operates on its primary winding in series with the secondary winding of the C relay. The C relay remains operated at this time to prevent any further vertical stepping. Resistors B and E in the S and S1 lead paths limit the C relay hold current. This allows the maximum external sleeve resistance to be increased to 25 ohms maximum and the maximum busy sleeve potential of 4 volts measured from sleeve terminal to ground.

1.05 Relay F operated:

- (a) Locks operated on its secondary winding.

- (b) Prepares a circuit for connecting the A relay to the T lead of the selector, selector connector, or attendant trunk circuit.

- (c) Transfers the stepping circuit from the vertical to the rotary magnet.

- (d) Further opens the release magnet circuit.

- (e) Further opens the T and R leads.

1.06 Relay F is made slow in operating to allow a short pause between the last vertical step and the first rotary step to prevent snagging of the brushes which are vibrating because of the vertical stepping action. The C relay is slow in operating to prevent it from reoperating the vertical magnet after its contact closes, but before it is fully released. The C relay is also slow in releasing to ensure that it holds when the finder locates the incoming line or trunk. The release circuit is opened on the operation of the F relay to preclude the possibility of the release or partial release of the shaft and reoperation of the A relay before the release of relay F. If this latter situation occurred, the rotary magnet would be energized without the shaft being centered on any bank level and jamming of the stationary dog or snagging of the brushes on the bank terminals might result.

B. Rotary Stepping

1.07 The secondary winding of the C relay is now under control of the interrupter contacts on the rotary magnet. Each time the rotary magnet is energized, the shaft is stepped around one step. This action will continue until either the S or S1 brush reaches a terminal to which the incoming line or trunk has connected battery.

C. Cut-Through

1.08 If the S brush finds this battery, relay B operates in series with the primary winding of the C relay sufficiently long enough to close its 1 and 2 contacts. Relay C remains operated thus preventing any further stepping. Closure of the 1 and 2 contacts on the B relay energizes its secondary winding causing the relay to fully operate. The B relay remains operated under control of the C relay until ground is returned from the selector, selector connector, or attendant trunk circuit on the S lead. This is done to ensure that the finder will not cut in on an adjacent busy terminal.

1.09 Relay B operated:

- (a) Partially closes the tip and ring leads through the circuit.
- (b) Further opens the release magnet circuit.

- (c) Opens the circuit to the primary winding of the E relay.
- (d) Closes the path to the primary winding of the D relay causing it to operate.
- (e) Connects the A relay to the tip conductor of the selector, selector connector, or attendant trunk.

1.10 Relay D operated:

- (a) Closes the S lead from the selector, selector connector, or attendant trunk circuit to the S brush.
- (b) Transfers the start lead from the A relay to the D relay.
- (c) Prepares a circuit for connecting the start lead to the A relay in the next finder through jack 16 of this switch and jack 14 of the next switch.
- (d) Opens the multiple chain circuit, the connection between the A and B leads.
- (e) Removes battery from the C and F relays and the vertical magnet thus causing both the C and F relays to release.

1.11 The battery is removed from the secondary winding of the C relay for the purpose of preventing its operation on the release of the finder switch. Battery is removed from the vertical magnet to prevent a false operation if relay F releases before relay C due to the difference in the releasing time of these two relays. The reason for connecting the A relay to the tip conductor of the selector, selector connector, or attendant trunk is to prevent its release until the S lead is grounded by these circuits, as the original operating circuit of the A relay was opened by the operation of the D relay.

1.12 Relay F released:

- (a) Completes the closure of the incoming tip and ring leads through to the selector, selector connector, or attendant trunk.
- (b) Completes the path for connecting the start lead through jack 16 of this switch and jack 14 of the next switch.
- (c) Disconnects the A relay from the tip conductor.
- (d) Partially closes the path to the release magnet.

1.13 If the S1 brush finds the battery on the bank terminal, relay E will operate on its primary winding in series with the primary winding of the C relay sufficiently to close its upper 1 and 2 contacts. The closing of these contacts energizes its

secondary winding causing the relay to fully operate.

1.14 Relay E operated:

- (a) Transfers the tip and ring leads from the T and R brushes to the T1 and R1 brushes.
- (b) Opens the circuit to the rotary magnet.
- (c) Closes the circuit for operating the B relay on its secondary winding.
- (d) Opens the circuit to the primary winding of the B relay.
- (e) Opens the circuit to the S brush.
- (f) Partially connects the S lead from the selector, selector connector, or attendant trunk to the S1 brush.

1.15 The circuit to the rotary magnet is opened to prevent the finder from taking an additional step. The primary winding of the B relay is opened to prevent a differential action in the B relay or an inductive kick in the C relay should the S lead of the bank to which the brushes are connected be busy. This condition would prevent the B relay from operating. Upon the operation of the B relay, the circuit functions as described when battery was found on the S brush. When relay F releases, the selector, selector connector, or attendant trunk is connected to the incoming line or trunk through the T1, R1, and S1 brushes.

2. RELEASE

2.01 The connection is held by the operated B relay. The B relay is held operated by ground on the S lead and the S or S1 brush. When these grounds are removed, the B relay releases and it causes the release magnet to become energized. When the switch returns to normal, the VON springs return to normal thus deenergizing the release magnet and the primary winding of the D relay and also causing the E relay to release, if operated. The D relay will release if its secondary winding is not energized. The secondary winding of the D relay will be energized if the finder is returned to normal at a time when the start lead is advanced through this finder circuit and has started a succeeding finder, until the finder started has found the incoming line or trunk.

2.02 If the incoming line or trunk disconnects before the brushes have reached the line or trunk terminal, the finder continues to step during the releasing time of the slow-release A relay in which case it would go to the limit of its rotary motion. If for any other reason, such as an open sleeve circuit, the finder fails to cut-through it will continue stepping until it reaches the

tenth rotary step. When the shaft reaches the tenth rotary position, the tenth rotary position springs will function. These springs open the operating path of the A relay and also closes a path to the secondary winding of the C relay thus keeping it operated and preventing any further attempts at stepping. When the slow-release A relay releases, it causes the D relay to operate on its secondary winding and it also causes the F relay to release. The release of the F relay completes the path to the release magnet which will cause the switch to return to normal as previously described.

3. GROUP CIRCUIT - SD FIG. 3

A. Grounded Start Lead

3.01 If the series start lead becomes permanently grounded, each line finder in the group will step to the tenth terminal of the tenth level in turn and release, but the D relays will hold on their secondary windings. When all the line finders have been operated, all the D relays are operated and the multiple chain circuit will be opened. The multiple chain circuit consists of the A and B leads connected together through the 3 and 4 contacts of the D relay and the 5 and 6 contacts of the MB key. When all the D relays are operated, therefore, the CH and S relays will release causing the OB relay to operate.

3.02 Relay OB operated:

- (a) Grounds the AFB, K, or OF lead to the traffic register circuit.
- (b) Connects the grounded start lead through to operate the GD relay.
- (c) Removes ground from all the subgroup G- relays to prevent further grounding of the start lead.
- (d) Operates the OB1 relay which performs no useful function at this time.
- (e) Partially completes the operating path for the PU and TO relays.

3.03 Operation of the GD relay causes the AL relay to operate.

3.04 Relay AL operated:

- (a) Locks under control of the AR key and opens its operating path.
- (b) Opens the operating path of the PU relay,
- (c) Operates the CI relay.
- (d) With X option, operates relay SC in series with the S lamp which lights.

3.05 Operation of the CI relay removes battery from all the CI leads thus releasing

all the D relays except the last one which is operated on its primary winding from ground on the VON contacts.

3.06 Operation of the SC relay grounds the CFA and CAP leads to the alarm circuit. Grounding the CFA lead causes the alarm circuit to sound an audible alarm, light a COM lamp in the switchboard, and cause a class A alarm to be transmitted to the central office. Grounding the CAP lead causes a common aisle pilot lamp, COM, to light.

3.07 The release of the D relays restores the multiple chain circuit thus causing the CH and S relays to reoperate. This causes the OB relay to release which in turn causes the GD relay to release. The release of the GD relay causes the CI relay to release and restore battery to the secondary winding of the D relays. If the start lead is still grounded, the cycle will be repeated. However, any calling line will receive service since its subgroup G- relay grounds the commutator and allows a line finder to cut in on that line.

3.08 The alarm will remain locked in until released by the operation of the AR key, releasing relay AL which in turn releases the SC relay.

3.09 With Y option, the operation of the AL relay causes a relay in the miscellaneous alarm circuit connected to the SC lead to operate in series with the S lamp which lights.

B. Foreign Potential on Chain Circuit

3.10 The chain circuit normally holds relays CH and S operated through break contacts 3 and 4 of all the D relays in the line finders. If this lead becomes crossed with either battery or ground, one of these two relays will release while the other relay will remain operated. If X option is provided and, with either the CH or S relays released, ground is applied to the C lamp which is in series with the SC relay. The C lamp will light and the SC relay will operate and perform the functions described in 3.01 through 3.09. With Y option the C lamp will light and a relay in the 701A miscellaneous alarm circuit that is connected to the SC lead will operate.

C. All Line Finders Busy

3.11 When all the line finders are busy, all the D relays are operated, thus opening the multiple chain circuit and causing the CH and S relays to release. The release of both of these relays causes the OB relay to operate.

3.12 Relay OB operated:

- (a) Grounds the AFB, K, or OF lead connected to the traffic register circuit.

- (b) Partially connects the grounded start lead through to the GD relay. However, this relay cannot operate since all G- relay are released.
- (c) Removes the ground from all the G-subgroup relays to prevent further grounding of the start lead.
- (d) Operates the OB1 relay.
- (e) Partially completes the operating path for the PU and TO relays.

3.13 Relay OB1 operated:

- (a) Closes its operating path around the contacts of the TO relay.
- (b) Disconnects the CAP, L, and CAS leads and connects the PAP, L1, and PSS leads through to the contacts of the TO relay.
- (c) Disconnects the CB lamp and connects the AFB lamp through to a contact on the TO relay when SD Fig. E is provided.
- (d) Opens the operating path of the CB relay.

3.14 Relay PU operates from ground on lead PU1 from the 701B alarm circuit if no other AFB or CB alarm is being timed in.

3.15 Relay PU operated:

- (a) Locks under control of the operated OB relay and the released TO relay.
- (b) Grounds the ST1 lead causing the alarm circuit to start a timing cycle.
- (c) Partially completes the operating path for the TO relay.

3.16 When the timing circuit has completed its timing, after approximately 15 to 30 seconds, the alarm circuit grounds the TO1 lead causing the TO relay to operate.

3.17 Relay TO operated:

- (a) Grounds lead PAP to light the PAP aisle pilot lamp.
- (b) Grounds lead L1 to light the AFB lamps at the switchboard and the alarm panel.
- (c) Opens the original operating path of the OB1 relay.
- (d) Locks under control of the operated OB relay.
- (e) Grounds lead PSS to cause the alarm circuit to transmit a class B alarm to the central office.

(f) Lights the AFB shelf lamp when SD Fig. E is provided.

(g) Opens the locking path of the PU relay causing it to release.

3.18 Relay PU released:

- (a) Opens the TO1 lead.
- (b) Removes ground from the ST1 lead thus releasing a relay in the alarm circuit.
- (c) Partially recloses the PU1 lead.

3.19 Should a finder become idle, the CH and S relays will reoperate thus releasing the OB relay. This causes the TO relay to release which in turn will extinguish the alarms.

3.20 When Y option is provided, the operation of the OB relay causes the PU relay to operate to ground supplied by the Y option. The PU relay grounds the DP lead to operate a timing relay in the 701A alarm circuit which, after a timed delay, grounds the L lead to operate the TO relay. The circuit functions as previously described except that the PU relay is under control of the OB relay.

D. Call Blocked

3.21 Any subgroup G- relay when operated grounds the CB lead causing the CB relay to operate unless relay OB1 is operated due to another alarm. Relay CB operated partially closes the operating path to the PU and TO relays. Relay PU operates from ground on the PU1 lead provided that another CB or AFB alarm is not being timed in by the alarm circuit.

3.22 Relay PU operated:

- (a) Grounds the ST1 lead to start the tipping relays in the alarm circuit.
- (b) Connects the TO1 lead to the TO relay.
- (c) Locks operated under control of the CB and TO relays and opens its operating path.

3.23 The alarm circuit after a delay of approximately 15 to 30 seconds connects ground to the TO1 lead causing the TO relay to operate.

3.24 Relay TO operated:

- (a) Locks under control of the CB relay and opens its operating path.
- (b) Grounds the CAS lead to cause the alarm circuit to transmit a class A alarm to the central office.
- (c) Lights the CB shelf lamp if provided.

- (d) Releases the PU relay.
- (e) Opens the operating path of the OB1 relay.
- (f) Grounds the L lead to cause the alarm circuit to light the CB lamp at the switchboard and alarm panel.
- (g) Grounds the CAP lead to cause the alarm circuit to light the COM aisle pilot lamp.

3.25 When Y option is provided, operation of the CB relay causes the PU relay to operate to ground supplied by the Y option. Operation of the PU relay grounds the DP lead to the 701A alarm circuit. Should the DP lead remain grounded for a predetermined interval, the alarm circuit will function to ground the L lead causing the TO relay to operate.

3.26 Relay TO operated:

- (a) Locks under control of the CB relay and opens its operating path.
- (b) Lights the CB shelf lamp.
- (c) Opens the operating path of the OB1 relay.

4. TEST LINE JACKS - SD FIG. 4

4.01 In a 2-digit PBX, the line circuit relays for line finder terminals 19 and 10 are not equipped and test jack B is connected to terminal 19. In a 3- or 4-digit PBX the line circuit relays for line finder bank terminals 99 and 90, in both the lower and upper hundreds group are not equipped. Test jack A is connected to terminal 99 of the upper hundreds group and jack B is connected to terminal 99 of the lower hundreds group.

4.02 The line circuit relays for line finder terminal -0 are not equipped because the lines are used for connector test lines.

4.03 Jack C gives access to the commutator terminals.

5. TEST KEY - SD FIG. C OR D

5.01 Test key (TST), SD Fig. C or D operated grounds the first subgroup G relay, SD Fig. 2, to start a line finder to hunt. Each switch except the last will operate, release, and pass the start wire to the next switch, the D relays holding from the start wire. When the last switch reaches the tenth terminal and the D relay operates, chain relays S and CH, SD Fig. 3, will release operating relay OB and opening ground from the start wire releasing all other D relays. The D relay in this switch, however, holds to the CON contacts until the switch is normal. The first D relay to release, reoperates relays CH and S, releasing OB, reclosing

ground to the start wire. This ground will be closed before the last switch restores to normal and hence its D relay will hold to the start wire. The switches now start to hunt and release as before except that the last switch will not hunt. At the end of the cycle all D relays release and on the next cycle all switches will hunt. This action continues as long as the TST key is operated, the last switch operating every other cycle. Normally one cycle should be a sufficient test. In SD Fig. D with test key TST operated, the operating path for relay GD is opened to prevent false operation of relay GD when relay OB operates.

6. LINE ASSIGNMENT

6.01 SD Fig. 6-10 shows the arrangement of the line finder subgroups. The commutator and line bank wiring is slipped between subgroups so that a line appearing on the first level in the tenth subgroup appears on the second level in the ninth subgroup, the third in the eighth subgroup, and so on. Each line in a 200 line group will terminate on the first level in some subgroup so that usually a line finder will have to hunt but a short time for the line. If the first line finder in that subgroup is busy and other finders in the same subgroup are busy, the start wire will be extended to the next subgroup, where this line will appear on the second level, which requires a slightly longer hunting time. Thus, the start wire is extended throughout the subgroups, giving the station access to every line finder in the group serving the 200 lines. The banks and commutators of switches in the same subgroups are multiplied so that these switches have the same 20 lines on their first levels.

7. TRUNK ASSIGNMENT

7.01 SD Fig. 6 shows the arrangement of the trunk finder subgroups. The commutator and trunk bank wiring is slipped between subgroups so that a trunk appearing on the first level in the tenth subgroup appears on the second level in the ninth subgroup, and so on.

7.02 Since the number of trunk finders will be less than the number of subgroups, the trunk finders should be assigned to the positions and in the order shown in SD Fig. 108. This order should be followed in order to minimize the hunting action of the switches.

7.03 The trunk finders are mounted on a relay rack bay which is designed for use as a supplementary bay for mounting a maximum of eight line finders. The switch in the first position on this bay being the thirty-third line finder position. Consequently, because of the slip arrangement, and in order to connect the first incoming trunk to the first rotary position of the first level of the first trunk finder position, it is necessary

to connect the trunk to terminal 31. To minimize hunting, the incoming trunks should be assigned as shown in Circuit Note 109.

8. LINE RESTRICTION TO FIRST SELECTOR

A. Individual Station Restriction

8.01 When X option is provided in the station line circuit, ground is placed on the T1 lead to the line finder circuit when the line relay operates. When relays F and E are operated in the finder, relay Z operates and locks to the sleeve(s) lead to the selector through contacts 3 and 4 of relay Z. Relay Z operated places a ground on the RS lead to the selector. The selector may be arranged to restrict certain levels by the operation of the normal post springs by a cam on the switch shaft. When ground is present on the RS lead (Z relay operated) the operated normal post spring passes the ground to the sleeve wiper of the selector switch. This ground causes the selector to step to the eleventh rotary position and return busy tone to the station. The Z relay releases when the calling party hangs up. The selector releases when the loop is opened removing ground from the sleeve lead to the finder and opening the normal post spring contacts.

B. Station Subgroup Restriction

N Option

8.02 All stations in a station subgroup may be restricted from any designated selector level by the application of N option in the line finder circuit. The normal post cams on the line finder switches must be bent out to operate the normal post springs for the subgroup level. When the switch finds a line on a restricted level, ground is placed on the RS1 lead to the selector switch. If a restricted level is dialed on the selector switch the normal post spring in operating will pass the RS1 lead ground to the wiper sleeve causing the selector to step to the eleventh rotary position and return busy tone to the calling station. Because a subgroup consists of 20 lines, restriction of a subgroup affects the lines in both the upper and lower banks. Thus, 15 lines in the lower bank and upper bank are restricted. If this conflicts with the desired restriction plan, individual station restriction must be used.

M Option

8.03 Option M is used for individual line restriction in the same subgroup. This will allow restriction in the selector controlled by the normal post springs in both line finder and selector.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 The battery voltage shall be -44 volts minimum and -52 volts maximum.

1.02 The maximum external sleeve condition resistance for a bank terminal to holding ground is 7 ohms.

2. FUNCTIONAL DESIGNATIONS

None.

3. FUNCTIONS

3.01 To find the incoming station line or trunk that has operated its associated subgroup relay.

3.02 To extend the tip and ring conductors of the incoming station line or trunk through to the associated selector, selector connector, or attendant trunk.

3.03 To extend the sleeve conductor of the incoming trunk through to the associated attendant trunk so that the finder is held by both the incoming trunk and the attendant trunk.

3.04 To extend the sleeve conductor of the incoming line through to the associated selector or selector connector so that the busy

3.05 To advance the start lead to the succeeding finder when the finder is in use or made busy.

3.06 To open the multiple chain circuit when the finders are busy.

3.07 To return the finder to normal when the finder fails to locate the incoming line or trunk and steps to the tenth position in the level.

3.08 To light an alarm lamp and cause the associated alarm circuit to function when the chain circuit is crossed with battery or ground.

3.09 To light and lock in an alarm lamp and cause the associated alarm circuit to function until restored by means of a key, when the start lead is crossed with ground and to release all the finders when the last one has been stepped to the tenth position on the tenth level.

3.10 To light an alarm lamp and cause the associated alarm circuit to function if the ground on the group relay fails to open after a given interval.

3.11 To light an alarm lamp and cause the associated alarm circuit to function when all

the finders common to a group of incoming lines are busy.

3.12 When all the finders common to a group of incoming lines are busy, to prevent the start lead from being grounded when another call comes in and to cause the all finders busy register to function.

3.13 To cause the associated alarm circuit to function when the switch fails to restore to normal after the release magnet is energized.

3.14 To provide access to the finder by means of a test jack.

3.15 To start the finder when testing by means of a test key.

3.16 To busy the individual finder by means of a make busy key mounted on the finder.

3.17 To extend ground to the first selector when a restricted station line dials a level or levels in which all stations are denied access to one or more levels of the first selector.

4. CONNECTING CIRCUITS

4.01 When these circuits are listed on a key sheet, the connecting information thereon is to be followed:

- (a) Selector Connector Circuit - SD-65721-01*
- (b) Incoming Trunk Circuit - SD-65792-01
- (c) Attendant Trunk Circuit - SD-65795-01
- (d) 701B Miscellaneous Alarm Circuit - SD-65761-01
- (e) First Selector Circuit - SD-66359-01*
- (f) 701A Miscellaneous Alarm Circuit - SD-66384-01
- (g) 702A Switch Trouble Alarm Circuit - SD-31514-01
- (h) Station Line Circuit - SD-66715-01*
- (i) 701B Traffic Register Circuit - SD-65774-01
- (j) Line or Trunk Finder - Common Group and Subgroup Circuit - SD-65871-01
- (k) 701A Traffic Register Circuit - SD-66329-01
- (l) 702A Traffic Register Circuit - SD-31109-01
- (m) Test Set - SD-66073-01

- (n) Power Ringing Circuit - SD-81337-01*
- (o) Converter Trunk Circuit - SD-65853-01
- (p) Jack Access Circuit - SD-32523-01

*Typical

5. MANUFACTURING TESTING REQUIREMENTS

5.01 This circuit shall be capable of performing all the functions specified in the circuit description and meeting all the requirements of the Circuit Requirements table.

6. TAKING EQUIPMENT OUT OF SERVICE

A. Make-Busy Key

6.01 The finder can be made busy by operating the MB make busy key that is mounted on the switch. Operation of this key advances the start lead to the next finder and also opens the connection between the A and B leads.

B. Removing Switch

6.02 When a switch is removed, terminals 14 and 16 on the jack become shorted. This advances the start lead to the next finder and also opens the connection between the A and B leads.

SECTION IV - REASONS FOR REISSUE

A. Changed and Added Functions

A.1 SD Fig. 12, H option, is rated Mfr. Disc. replaced by F option which provides a TU lead to the traffic usage recorder circuit or a TMS lead to the 1A traffic measuring system.

D. Description of Changes

D.1 The connection between contact 7 of relay A and contact 7 of relay D has been removed. Contact 7 of relay A is now connected to contact 7 of relay B. This change is made to correct an error on the circuit schematic and will bring this drawing in agreement with manufacturing information. This change is made on a no-record basis.

D.2 Circuit Note 116 is added.

D.3 Option G is rated A&M only and option K is rated Standard. Option K allows the line finder circuit to be compatible with the automatic call through test circuit, and must be coordinated with appropriate options in the central office trunks.

D.4 Option E is added and rated A&M Only to show lead TMS to the TMS-1A scanner

circuit. This A&M Only option is provided to make this circuit agree with the TMS-1A application schematic, SD-5E061-01.

D.5 Note 111 is rated A&M Only.

D.6 Note 114 is rated Mfr Disc.

D.7 Note 203 is rated Mfr Disc.

D.8 CAD Fig. 3, 38, 39, and 42 have been rated Mfr Disc. CAD 37 is rated A&M Only.

D.9 CAD Fig. 43 and 44 have been added to supply terminations for the RS1 and TU or TMS leads.

D.10 Soak values for relay C and Note 16 have been added to the Circuit Requirement tables.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 3223-HRB-FLS